IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Mamoru UCHIDA et al.

Serial Number: 09/627,424

Filed: July, 27, 2000

For: STUDLESS TIRE

Group Art Unit: 1733

Examiner: MAKI, STEVEN D

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
Washington, D.C. 20231

Sir:

Mamoru Uchida residing at 2-72, Takenodai 2 chome, Nishi-ku, Kobe, Hyogo, Japan duly deposes and says:

1. That he graduated from Department of Chemical Science and Engineering, Faculty of Engineering, KOBE UNIVERSITY, Hyogo, Japan, in the year 1979, and he received the degree of Master of Chemical Science from GRADUATE SCHOOL OF KOBE UNIVERSITY, Hyogo, Japan in the year 1981;

2. That since 1981, he has been employed in the capacity of Sumitomo rubber Industries, Ltd.;

3. That from 1996 he has been engaged in development for compound.;

4. That he has read and is familiar with the instant application for United States Letters Patent and Office Action thereto mailed November 16, 2004.; and

5. That he has made experiments in order to show that when

the staple fiber length is 0.1 to 5 mm, the obtained tire has excellent braking performance on ice and abrasion resistance.

Experiments 1 and 2

A rubber composition was prepared according to the compounding ratio (parts by weight) shown in Table 1. The rubber composition was prepared so that the staple fiber length was maintained by kneading the glass fiber having average staple fiber length of 3 mm and 0.1 mm respectively by rolling with a calender roll, without using a sealed mixing machine. Then, using the machine shown in Fig. 1, the rubber composition was extruded into a tube and a rubber sheet was obtained, in which the staple fibers are oriented in a perpendicular direction A (in a tread thickness direction) to the extrusion direction B, as shown in Fig. 2. A tire was molded and prepared using the obtained rubber sheet for the tire tread. Using the obtained tire, the average length of the staple fibers in the rubber, the complex elastic modulus, the braking performance on ice, the abrasion resistance and rubber hardness were measured in the same manner as in Example 1 of the instant specification. The results are shown in Table 1.

Experiment 3

A rubber composition was prepared according to the compounding ratio shown in Table 1 in the same manner as in Experiment 1, except that carbon fiber having average staple fiber length of 6 mm was used instead of glass fiber. A rubber sheet was obtained and a tire was molded and prepared using the obtained rubber sheet for a tire tread in the same manner as in Example 1. Using the obtained

tire, the average length of the staple fibers in the rubber, the complex elastic modulus, the braking performance on ice, the abrasion resistance and rubber hardness were measured in the same manner as in Example 1 of the instant specification. The results are shown in Table 1.

Experiment 4

A rubber composition was prepared according to the compounding ratio shown in Table 1 in the same manner as in Experiment 1, except that kneading was repeated using a sealed mixing machine instead of rolling so that the average length of the staple fibers in the rubber composition became 0.08 mm. A rubber sheet was obtained and a tire was molded and prepared using the obtained rubber sheet for a tire tread in the same manner as in Example 1. Using the obtained tire, the average length of the staple fibers in the rubber, the complex elastic modulus, the braking performance on ice, the abrasion resistance and rubber hardness were measured in the same manner as in Example 1 of the instant specification. The results are shown in Table 1.

Table 1

	Ex. 1	Ex. 2	Ex. 3	Ex. 4
Natural rubber	60	60	60	60
High-sys polybutadiene	40	40	40	40
Carbon black N220	45	45	45	45
Silica	20	20	20	20
Paraffin oil	25	25	25	25
Wax	2	2	2	2
Antioxidant	1.5	1.5	1.5	1.5
Stearic acid	2	2	2	2
Zinc white	3	3	3	3
Glass fiber	3	10	-	10
Carbon fiber	-	-	5	-
Silane coupling agent	1.2	1.2	1.2	1.2
Sulfur	1.5	1.5	1.5	1.5
Vulcanization accelerator	1	1	1	1
Average length of staple fibers (mm)	3	0.1	6	0.08
Aspect ratio of staple fibers	273	9.1	414	7.3
Complex elastic modulus E1	6.6	5.5	10	5.1
Complex elastic modulus E2	4.4	4.3	5	4.3
E1/E2	1.5	1.28	2	1.19
Rubber hardness	63	61	62	52
Braking performance on ice	122	118	100	98
Abrasion resistance	101	100	91	99

Natural rubber: RSS#3 grade

High-cis-polybutadiene: UBEPOL BR150B available from Ube Industries, Ltd.

Carbon black 220: SHO BLACK N220 available from Showa Cabot Co., Ltd.

Silica: Nipsil VN3 available from Nippon Silica Co., Ltd.

Paraffin oil: Diana process oil available from Idemitsu Kousan Co., Ltd.

Wax: SUN NOC N available from Ohuchi Shinko Kagaku Kogyo Co. Ltd.

Antioxidant: NOCRAC 6C available from Ohuchi Shinko Kagaku Co.,

Stearic acid: stearic acid available from NOF CORPORATION

Zinc white: Zinc oxide 2 available from Mitsui Mining & Smelting Co., Ltd.

Glass fiber: average fiber diameter of 11 μm, average length of 3 mm

Carbon fiber: average fiber diameter of 14.5 μm, average length of 6 mm

Silane coupling agent: Si69 (bis(3-triethoxysilylpropyl)tetrasulfide) available from Degussa Co., Ltd.

Sulfur: Powder sulfur available from Tsurumi Chemical Co., Ltd.

Vulcanization accelerator: NOCCELER CZ available from Ohuchi Shinko Kagaku Kogyo Co. Ltd.

Result and Discussion

As evident from the results of Table 1, when the average length of the staple fibers does not satisfy 0.1 to 5 mm, an tire having excellent braking performance on ice and abrasion resistance are not obtained, even when the average fiber diameter and the complex elastic modulus ratio satisfy Claim 1. On the other hand, when the average fiber diameter, the complex elastic modulus ratio and the average length of the staple fibers (0.1 to 5 mm) all satisfy the scope of the Claims, the tire has excellent braking performance on ice and abrasion resistance even when the average length of the staple fibers is not 0.5 mm.

The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 28th day of March, 2005

by M. Uchida

Mamoru Uchida

We, the undersigned witnesses, hereby acknowledge that Mamoru Uchida is personally known to us and did execute the foregoing Declaration in our presence on:

Date: Witness _____

Date: Witness _____